Exam. Code : 103201

Subject Code : 1034

B.A./B.Sc. 1st Semester

QUANTITATIVE TECHNIQUES—I

Time Allowed—Three Hours]   [Maximum Marks—100

Note :— Candidates are required to attempt **FIVE** questions, selecting at least **ONE** question from each section.

The **fifth** question may be attempted from any section.

SECTION—A

1. (i) Solve the equations $\dfrac{2}{x}+\dfrac{3}{y}=18$, $\dfrac{4}{x}+\dfrac{9}{y}=48$.

   (ii) If a, b, c are in AP, show that $\dfrac{1}{bc},\dfrac{1}{ca},\dfrac{1}{ab}$ are also in AP.

   (iii) The value of a machine depreciates by 5% annually, what will be its estimated value at the end of 4 years if its present value is Rs. 16,000.

                                                          6+6+8

2. (i) Solve the equation $4.2^{2x+1} - 9.2^x + 1 = 0$.

   (ii) Find the value of $.43\dot{7}$.

(iii) A man repays the loan of Rs. 3,250 by paying Rs. 20 in the first month and increases the payment by Rs. 15 every month. How long will it take to clear his loans ? 6+6+8

SECTION—B

3. (i) Find the equation of a straight line which passes through the point (1, 3.5) and sum of its intercepts on the coordinate axes is 9.

(ii) Explain the concepts of permutation and combination.

(iii) Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that :

(a) all vowels occur together

(b) all vowels do not occur together. 6+6+8

4. (i) Define set. Explain various types of sets.

(ii) In a class of 25 students, 12 students have taken economics, 8 have taken economics but not politics. Find the number of students who have taken economics and politics, and those who have taken politics but not economics.

(iii) Explain difference and symmetric difference of sets with the help of Venn-diagrams. 6+6+8

SECTION—C

5. (i) Explain the concepts of constant and variable.

   (ii) Explain various types of functions with the help of graphs.

   (iii) Define limit and evaluate the $\text{Limit}_{x \to \sqrt{2}} \dfrac{x^2 - 2}{x - \sqrt{2}}$.

   6+8+6

6. (i) Find the limit of the function $\dfrac{e^x - 1}{x}$ as x tends to zero.

   (ii) Discuss the concept of continuity. Evaluate the continuity of a function $\dfrac{1}{x-1}$ at x = 1.

   (iii) Find the derivative of log x by first principle method.

   6+8+6

SECTION—D

7. Find derivative of the functions :

   (i) $y = \left(x + \dfrac{1}{x}\right)\left(\sqrt{x} + \dfrac{1}{\sqrt{x}}\right)$

   (ii) $y = \log \sqrt{\dfrac{1 + x + x^2}{1 - x + x^2}}$

   (iii) $e^x + e^y = e^{x+y}$, prove that :

   $$\dfrac{dy}{dx} = -e^{y-x}.$$

   6+6+8

8. (i) The total revenue function of a firm is $TR = 12x + \frac{1}{2}x^2 - \frac{1}{3}x^4$. Show that at the highest point of AR function, the AR is equal to MR.

   (ii) Show that elasticity of demand $= \dfrac{AR}{AR - MR}$ at price $= 5$ when the demand function is given by $p = 50 - 3x$ where p is price and x is quantity.

   10+10